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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,556	10/20/2003	Dawson Richards Engler	STFD.043PA	8388
7590 Crawford Maunu PLLC Suite 390 1270 Northland Drive St. Paul, MN 55120		08/01/2007	EXAMINER BERMAN, MELISSA J	
			ART UNIT 2129	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/689,556	<b>Applicant(s)</b> ENGLER, DAWSON RICHARDS	
	<b>Examiner</b> Melissa J. Berman	<b>Art Unit</b> 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/30/2004</u> | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This action is responsive to application 10/689556 filed on 10/23/2003. Claims 1-25 have been examined.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-25 are rejected under 35 U.S.C. 102(a) as being anticipated by **Engler et al.** (Bugs as Deviant Behavior: A General Approach to Inferring Errors in Systems Code, 2001) hereafter referred to as **Engler**.

#### **Claim 1, 9, 10, 18**

**Engler** disclosed a method for identifying errors in program code, comprising:

performing by a processor the steps including, counting in the program code respective numbers of observances (check message, see e.g., §3.3-§5.2, especially §3.4 and §5; EN: instances record how often a rule was checked, stored as variable “n” and the number of successful checks “n”) of at least one correctness rule (rule, rule template, combination, see e.g., §1; §3-§4.1) by different code instances that relate to the at least one correctness rule (slot instances, instances, see e.g., §1-§6, especially §3.3), wherein each code instance has an associated counted number of observances of the correctness rule by the code instance (“c”, see e.g., §3.3-§5.2, especially §3.4 and §5; EN: instances record how often a rule was checked, stored as variable “c”);

counting in the program code respective numbers of violations (errors, see e.g., §3.3-§5.2, especially §3.4 and §5; EN: instances record how often an error was encountered, stored as variable “e”) of the at least one correctness rule (rule, rule template, combination, see e.g., §1; §3-§4.1) by different code instances (rule, rule template, combination, see e.g., §1; §3-§4.1) by different code instances that relate to the at least one correctness rule (slot instances, instances, see e.g., §1-§6, especially §3.3) that relate to the at least one correctness rule, wherein each code instance has an associated counted number of violations of the correctness rule by the code instance (“e”, see e.g., §3.3-§5.2, especially §3.4 and §5; EN: instances record how often an error was encountered, stored as variable “e”);

determining for each code instance a respective likelihood of validity of the code instance as a function of the counted number of observances and counted number of violations, wherein the likelihood of validity indicates a relative likelihood that a related code instance is required to observe the correctness rule (statistical analysis, z statistic, “z”, see e.g., §1; §3-§3.4, especially “more generally we use the “hypothesis test statistic” to rank errors based on the ratio of successful checks to errors” §3.3; §5); and

outputting the violations in order of the likelihood of validity of a violated correctness rule (ranking, see e.g., §1; §3-§3.4, especially “more generally we use the “hypothesis test statistic” to rank errors based on the ratio of successful checks to errors” §3.3; §5).

**Claim 2, 11, 19**

**Engler** disclosed method of claim 1, wherein the determining step further comprises determining a likelihood of the validity of each code instance as a function of an expected ratio of

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observances to violations, the counted number of observances, and the counted number of violations (ratio, see e.g., §1; §3-§3.4, especially “ratio of successful checks to errors” §3.3; §5).

**Claim 3, 12, 20**

**Engler** disclosed the method of claim 2, wherein the determining step further comprises statistically ranking each violation according to a number of standard deviations away, a ratio of the counted number of observances to the counted number of violations is from the expected ratio (see e.g., §1; §3-§3.4; especially “measure the number of standard errors away the observed ratio is from an expected ratio” §5).

**Claim 4, 13, 21**

**Engler** disclosed the method of claim 3, wherein statistically ranking each violation includes determining a z statistic for proportions (see e.g., §1; §3-§3.4; especially z statistic §5).

**Claim 5, 14, 22**

**Engler** disclosed method of claim 1, further comprising:

wherein a first correctness rule specifies that a variable (“v”, variable, see e.g., col “Template (T)” Table 2; §1; § 3.3-§4.1) must be protected by a lock (“l”, lock, see e.g., col “Template (T)” Table 2; §1; § 3.3-§4.1) before accessing the variable (“l protects v”, or lock protects variable, or “l protects a”, or lock protects a”, see e.g., col “Template (T)” Table 2; §1; § 3.3-§4.1);

the step of counting an observance of the first correctness rule by a particular code instance includes identifying program code that locks a particular first variable (“a”, see e.g., col “Template (T)” Table 2; §1; §3.3-§4.1) followed by program code that accesses a particular second variable (“b”, see e.g., Template 2; §1; § 3.3-§4.1); and

the step of counting a violation of the first correctness rule by the particular code instance includes identifying program code that accesses the particular second variable where no preceding program code locks the particular first variable (see e.g., especially code related by implementation and code related abstractly, §4.2).

**Claim 6, 15, 23**

**Engler** disclosed the method of claim 1, further comprising:

wherein a first correctness rule specifies that invocation of a first function must not follow an invocation of a second function in the program code (see e.g., §9-§9.3, especially “<b> must follow <a>” or “no <a> after <b>”, EN: Temporal rules);

the step of counting an observance of the first correctness rule by a particular code instance includes identifying program code that includes a sequence of instructions that includes invocation of a particular second instruction and no previous invocation of a particular first function (see e.g., §9-§9.3, especially “<b> must follow <a>”, EN: Temporal rules); and

the step of counting a violation of the first correctness rule by the particular code instance includes identifying program code that includes a sequence of instructions in which an invocation of a particular first function is present following invocation of a particular second instruction (see e.g., §9-§9.3, especially “no <a> after <b>”, EN: Temporal rules).

**Claim 7, 16, 24**

**Engler** disclosed the method of claim 1, further comprising:

wherein a first correctness rule specifies that invocation of a first function must follow an invocation of a second function in the program code (see e.g., §9-§9.3, especially “<b> must follow <a>” or “no <a> after <b>”, EN: Temporal rules);

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the step of counting an observance of the first correctness rule by a particular code instance includes identifying program code that includes a sequence of instructions that includes an invocation of a particular first function following invocation of a particular second instruction (see e.g., §9-§9.3, especially “<b> must follow <a>”, EN: Temporal rules); and

the step of counting a violation of the first correctness rule by the particular code instance includes identifying program code that includes a sequence of instructions that includes an invocation of the particular second instruction without a previous invocation of the particular first function (see e.g., §9-§9.3, especially “no <a> after <b>”, EN: Temporal rules).

**Claim 8, 17, 25**

**Engler** disclosed the method of claim 1, further comprising:

wherein a first correctness rule specifies that data returned from a first function must be tested for a status indication (check, see e.g., §3.1-§3.2; §4; §6-§7.3; EN: status check for status NULL);

the step of counting an observance of the first correctness rule by a particular code instance includes identifying program code that includes a sequence of instructions that includes an invocation of a particular first function and a subsequent test of data returned from the particular first function (see e.g., §3.1-§3.2; §4; §6-§7.3; EN: subsequent tests use belief sets, which test where the current status and what is true in the belief set contradict); and

the step of counting a violation of the first correctness rule by the particular code instance includes identifying program code that includes a sequence of instructions that includes an invocation of a particular first function without a subsequent test of data returned from the

particular first function ("flagging", see e.g., §3.1-§3.2; §4; §6-§7.3; EN: belief contradicts the pointer, is therefore already set as a an error, without summoning subsequent tests).

### *Conclusion*

The prior art of record and not relied upon is considered pertinent to the applicant's disclosure.

- Haley et al. (Patent No. 6154876)
- Leino et al. (Pub No. 2002/0046393)
- Engler et al. (Checking System Rules Using System-Specific, Programmer-Written Compiler Extensions, 2000)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melissa Berman whose telephone number is 571-270-1393. The examiner can normally be reached on 9/4/5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MB

Melissa Berman

  
DAVID VINCENT  
SUPERVISORY PATENT EXAMINER